

## **Teacher development in Massive Open Online Courses Evaluating reflective practice in a sustainability MOOC**

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### **ABSTRACT**

Massive Open Online Courses (MOOCs) appear particularly relevant in education for sustainability. Teachers need to critically reflect on their teaching to develop as teachers and improve student learning, but the MOOC related literature has paid little attention to teacher development. In this paper, we apply and evaluate a framework for teacher development – Brookfield's critically reflective practitioner – in a MOOC context. We present a case study of two teachers who developed and delivered the *Sustainability in Everyday Life* MOOC. We analyse how they used Brookfield's four reflective lenses: the autobiographical lens, the student lens, the peer lens, and the scholarship lens. While all four lenses contributed to the reflection process, they were insufficient in a MOOC context. Additional and important reflective lenses include the perspectives of the organisational leadership, the public and media as well as learning analytics. We discuss the implications of those additional lenses in the MOOC context, but they could be relevant for modern higher education in general.

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## INTRODUCTION

Massive Open Online Courses (MOOCs) have recently become a significant force in higher education, attracting universities and companies to invest in the development of and research about this new learning environments ([1], [2], [3]). The promise of MOOCs to provide open, high-quality educational resources to a broad audience ([4], [5]) make them particularly relevant in sustainability education, even though the previously promised revolutionary effects on higher education learning have not yet fully materialized ([6], [7]). Some of the unresolved problems include high dropout rates [8], teaching and quality issues [4] and the concern that MOOCs mostly attract learners with high socio-economic and educational status [9], as well as a high IT affinity [2]. The quality of course resources has a major influence on learner engagement in MOOCs [10]. Yet for the teachers, their experience of developing and running a MOOC usually differs significantly from normal campus teaching [1]. That raises the question of how they can and should develop as teachers in a MOOC environment and whether this process differs from campus teacher development.

### 1 BACKGROUND: TEACHER DEVELOPMENT AND REFLECTIVE PRACTICE

One approach to teacher development in the educational literature is the concept of *reflective practice* ([11], [12]). Reflection entails “*those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation*” [11]. Reflective practice is the continuous use of reflection as a tool for revisiting experience in order to learn from it and frame complex problems of educational practice [12]. Various models of reflection and reflective practice have been developed. Among the most prominent are Brookfield’s critically reflective practitioner [13], Kolb and Fry’s concept of experiential learning [14], Argyris and Schön’s idea of single- and double-loop learning [15], which led to the concept of triple-loop learning [13], and Gibbs’ structured debriefing [16]. Most models of reflective practice share the premise that prior experience is examined and the result deliberately used to improve current practice. This is often triggered by a need or a disruption of the usual and can involve several iterations, levels and perspectives [17]. Thus, an important element to support reflective practice is feedback to assess and manage teaching performance.

However, little attention has been paid to teacher development in the MOOC related literature. Student engagement and learning success have been the most important MOOC research themes, followed by MOOC design and curriculum [18]. Teacher development was not part of the list at all. Thus, there is a need for a systematic framework for teacher development in the context of MOOCs. In this work, we attempt to apply and evaluate Brookfield’s *critically reflective practitioner* [13] model in the MOOC context. After describing Brookfield’s model in more detail, we analyze how two MOOC teachers used it to reflect upon their teaching practice in the MOOC *Sustainability in Everyday Life*. Based on this analysis, we assess the value of each model component and identify important perspectives that are missing.

## 2 BROOKFIELD'S CRITICALLY REFLECTIVE PRACTITIONER

According to Brookfield, teachers need to become critically reflective practitioners to improve their teaching practice. This is not a trivial endeavor, as individuals are typically "*trapped within the perceptual frameworks that determine how we view our experiences*" [13]. Teachers can strive to overcome this limitation by using different perspectives, or *reflective lenses*, that provide different and new angles on what they are and do. This enables teachers to see beyond their own interpretive filters and to detect false assumptions, and is therefore superior to exclusively relying on own experiences. Brookfield identifies four reflective lenses: 1) the *autobiographical* lens or the teachers' own experiences as learners, 2) the *student* lens or their students' experiences, 3) the *peer* lens or their colleagues' experiences, and 4) the *scholarship* lens or drawing on the educational literature.

### 2.1 The autobiographical lens

The autobiographical lens is the foundation where teachers focus on their prior experiences as learners. By examining their autobiographies, teachers are taking on the role of the student, enabling them to better see their practice from their students' perspective. Through the autobiographical lens, teachers can "*become aware of the paradigmatic assumptions and instinctive reasonings that frame how we work*" [13].

### 2.2 The student lens

Self-reflection is the basis of reflective practice. But Brookfield encourages teachers to also engage with student feedback to enhance student learning and possibly reveal "*those actions and assumptions that either confirm or challenge existing power relationships in the classroom*" [13].

### 2.3 The peer lens

The peer lens stresses the importance of feedback from colleagues. Colleagues usually have similar experiences as the teacher on a broader level, but might have different approaches to deal with issues when it comes to more detailed practices.

### 2.4 The scholarship lens

Brookfield's final lens is the scholarship lens, or engaging with the literature on higher education. Reading educational literature or conducting educational research can provide various perspectives on the teaching situation. It also equips teachers with a more advanced vocabulary to describe and discuss their practice to "*understand the link between their private troubles and broader political processes*" [13].

## 3 METHOD

In order to assess Brookfield's framework in a MOOC context, we conducted a qualitative case study of the MOOC *Sustainability in Everyday Life* offered by Chalmers University of Technology [19].

### 3.1 The MOOC *Sustainability in Everyday Life*

*Sustainability in Everyday Life* was developed as one of Chalmers' first MOOCs because of the university's strong emphasis on sustainable development. This introductory-level course aimed at developing the learner's capacity to grasp the complexities of sustainable development to enable them to make better-informed sustainable choices and decisions in everyday life. The course was developed from scratch since here was no prior campus course or material. The course included five modules that each consisted of an introductory video, several mini-lectures with test

yourself quizzes, weekly assignments (mainly multiple-choice quizzes), and a peer graded writing assignment as a final exam. The MOOC ran during summer 2015 with about 10k learners and had a re-run during autumn 2016 with about 5k learners.

### 3.2 Data collection

Data were collected from two Chalmers teachers who developed and delivered the MOOC and used Brookfield's framework to reflect upon their teaching. We used an ethnographic approach to study how the teachers used the framework and to assess the value of the different reflective lenses. Data were collected through 1) observations of the teachers during the course development and delivery phases, 2) interviews with both teachers before the course, 3) focus group meetings after the course, and 4) reflective diaries written by the teachers.

## 4 RESULTS – USING THE REFLECTIVE LENSES IN MOOC TEACHING

### 4.1 The autobiographical lens

Through the reflective diaries, it is possible to follow the teachers' experiences. Both teachers have a background in systems thinking, and prefer a deductive teaching approach, beginning with the big picture and then adding the appropriate details :

*I think we have also tried to do this in the MOOC by starting with an overview for each of the five topics that are addressed (the introductory lecture) and then go into more detailed subjects that are part of these topics.*

The teachers' prior experiences led to some differences. Teacher B pointed out that (s)he, while having poor mathematical skills throughout high school, experienced a tremendous improvement during university studies, since (s)he enjoyed the math-related courses. Based on this experience, teacher B believes that enjoyment is a key factor for creating motivation, both on campus and in a MOOC:

*I also try to make my teaching enjoyable for the students, because I am convinced that this will increase the motivation of some students at least to do well.*

During the design and development of the MOOC, (s)he stressed that it should be fun to do the MOOC, both for the teachers and the learners. Teacher A also experienced some struggles as a student, particularly for subjects that were "less interesting". This often manifested itself as issues with connecting sub-complexes of knowledge. In contrast to teacher B, teacher A therefore stressed the importance of details and understanding connections, even if that is not always pleasant:

*I realised the importance of taking care of the details and actually do the job!  
Learning is hard work, not always something I enjoy, but the knowledge is great fun.*

This view influenced this teacher's view on instructional design. Good teaching should help students to identify the topics that they need to learn through exercises, projects and discussions:

*I believe that dialogue, questions, and talking are important parts in learning and teaching which create co-learning and discovery of knowledge which also the students appreciate. That part is really fun!*

This highlights the importance of interactivity in learning and clearly impacted the MOOC's design, particularly in the planning phase, where interactivity was a guiding concept that got somewhat compromised in the implementation phase due to the technical limitations set by the MOOC platform.

## 4.2 The student lens

The student lens was mainly used when the teachers examined the comments in the discussion forum and the feedback in the course evaluations. Both were anonymous and the feedback was at times quite negative, especially during the first run of the MOOC, where harsh language, e.g. through writing in capital letters (“shouting”), was used in the discussion forum to criticise the early assignments. Though it can be hard to accept negative feedback, the teachers felt that it was nevertheless useful:

*To some extent at least, the harsh criticism during the first run helped us to improve the MOOC a fair bit.*

The teachers reacted to the negative feedback by engaging a beta tester to identify mistakes in quizzes and assignments before they were released. This contributed to an overall improved quality. Some learners thought the workload was higher than expected, but overall the feedback after the first run was positive and learners appeared to be satisfied with the course and their learning outcomes. The quality of the video material was generally perceived as good, an indicator that the theoretical foundations of the different topics were sound. The learners’ feedback was mainly used to revise the quizzes and assignments for the re-run of the MOOC. This revision led to a more civilised and constructive climate in the discussion forum. The discussion forum also revealed the learners’ engagement and passion for the course topic. This change of climate and the course evaluation pointed to an improvement of the course’s learning activities.

## 4.3 The peer lens

The peer lens was primarily used during the development of the MOOC, where the two teachers interacted with different groups of peers at different times. The colleagues at their division were important for identifying topics for the videos, and for recording and providing video material to the MOOC.

Another group of important peers was the production team, both during the development and the running of the MOOC. In the development phase, the production team provided guidelines and practical solutions for various issues. Among other things, this included video production and presentation techniques, manuscript preparation, assignment and exercise design, platform implementation and content organisation. The production team contributed to the reflection processes with its feedback and by pragmatism, problem solving and agility, particularly during the intense start of the MOOC.

During the re-run, members of the production team were beta testers of the revised content and they helped with monitoring the forum. If there were any technical issues with the videos, exercises or the exam they could quickly take corrective measures. The peers at the teachers’ division were interested in taking part in the evaluations and also using the MOOC for research purposes. They also helped providing arguments to gain further funding for MOOC development and re-design.

## 4.4 The scholarship lens

The scholarship lens included both the study of educational literature and a number of presentations and publications by both teachers. The literature on MOOCs was used by the teachers to support the development phase and to reflect upon the course results as a benchmark. For the course design, literature on best practice was consulted that provided suggestions regarding video length, activation exercises and presentation style.

Both teachers used the experience of the MOOC to conduct pedagogical research on the MOOC that was presented at several conferences and published in journals and as book chapters [20]. A major topic of reflection in these publications was the different roles that teachers take in a MOOC in order to make it successful.

#### **4.5 Evaluating the four reflective lenses**

The four reflective lenses have been useful for the teachers to reflect on MOOC teaching practice. Each of the lenses contributed in a somewhat different way to the reflection process, as demonstrated. Overall, the teachers experienced the autobiographical lens and the student lens as most influential. It is however difficult to generalize this judgement given, for example, the crucial feedback from peers on certain aspects of the MOOC. The teachers also mentioned several other sources of feedback with additional perspectives that might be somewhat particular to the MOOC context and did not seem to fit into any of the lenses above. These lenses are discussed in the next section.

### **5 DISCUSSION – ADDITIONAL REFLECTIVE LENSES IN MOOC TEACHING**

First, as the learner interaction in a MOOC happens in an online environment, the teachers felt that a lot of data are generated that can be analysed to reflect upon the MOOC. They used *learning analytics* to see, for example, different activity trends, completion rates of assignments and videos, and correlate that with other factors such as video length, to identify outliers in the material that need adjustment.

Second, for the teachers, it became apparent that the quality of a MOOC is not only judged in relation to learning, but also to other objectives. In this regard, the Chalmers *leadership perspective* provided an additional reflective lens. Though not directly involved in the production of the MOOC, this important stakeholder had objectives such as open access to the learning resources, increased visibility and improved campus education through the MOOC. These goals are not by default connected to good teaching, but since they are perceived as important for the project as a whole, the teachers are assessed and receive feedback along those dimensions as well. This might result in somewhat conflicting recommendations for teaching practice in the MOOC. Related to the objective of increased visibility, the teachers also incorporated feedback from a marketing perspective that was mainly provided by the marketing departments at Chalmers and the MOOC platform. It also concerned more teaching related aspects such as the course title, the formulation of learning objectives, the course description and syllabus, as well as the engagement with learners on social media platforms. The critical reflection regarding those aspects did not only relate to the course goals and intended learning outcomes, but also to marketability, e.g. in search engine optimization and job market demand.

Finally, *the media and the public* also provided a reflective lens. The teachers gave several interviews in various media. In an article published in the local newspaper, the content of the MOOC was heavily criticised and the teachers (and Chalmers) were accused of being normative and of blaming everyone who did not appreciate the learning outcomes of the MOOC. To be publicly criticised in the local media was perceived as scary and affected the reflection process of the teachers about the MOOC practice and how it should be communicated to the media and the public.

In sum, we have identified three additional and important perspectives or reflective lenses that teachers needed to take into account in MOOC teaching practice: the learning analytics lens, the leadership lens (including marketing), and the media and public lens. Each of those additional lenses contribute to the reflection process in its

own way. These additional lenses are probably more relevant in a MOOC context than in campus teaching, since teaching in a MOOC takes place in a more exposed and complex environment than most campus teaching. Thus, more factors must be considered in MOOC teaching as a whole. In principle, all of those aspects could also be relevant for campus teaching, but since campus teaching usually takes place in a more well-defined and institutionalized environment, those factors are not as obvious and eventually also handled by other roles than the teacher. However, the modern university is slowly transforming and the learning analytics perspective is certainly relevant for campus teaching today which increasingly uses learning management systems and digital tools. Further research should examine those aspects.

## 6 CONCLUSIONS

In this article, we examined how two teachers used Brookfield's model of the critically reflective practitioner to reflect on their teaching practice in a MOOC. We conclude that the four reflective lenses in Brookfield's model are not sufficient to be a reflective teacher in a MOOC context, but need to be augmented by at least three more lenses. Learning analytics, the leadership and marketing perspectives as well as the interaction with media and society have all been demonstrated to be relevant. These aspects are not part of campus courses and are additional perspectives for teachers to reflect about. It is apparent that the reflective practitioner in the MOOC context has to reflect on a wider range of aspects than in traditional teaching to become a good teacher, but also has access to a wider range of feedback.

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